Question Paper Code : X 60510

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020

Seventh Semester

Electrical and Electronics Engineering

EE 2401/EE 71/10133 EE 701 – POWER SYSTEM OPERATION AND CONTROL

(Regulations 2008/2010)

(Common to PTEE 2401/10133EE701 – Power System Operation and Control for B.E. (Part-Time) Fifth Semester – EEE – Regulations 2009/2010)

Time : Three Hours   Maximum : 100 Marks

Answer ALL questions

PART – A   (10×2=20 Marks)

1. Define the term "maximum demand".

2. Define "load curve".

3. Give two conditions for proper synchronizing of alternators.

4. What is the function of load frequency control ?

5. What is an exciter ?

6. What is meant by stability compensation ?

7. Find the incremental transmission losses for a two area power system, where the bus voltages are kept fixed and the line power flow is a function of line angle. Power loss is a function of generation of area B only.

8. What is spinning reserve ?

9. What is meant by state estimation ?

10. What are the functions of SCADA ?

PART – B **(5×16=80 Marks)**

11. a) i) A generating station has the following daily load cycle. **(10)**

Time (hrs)	0 – 6	6 – 10	10 – 12	12 – 16	16 – 20	20 – 24
Load (Mw)	40	50	60	50	70	40

Draw the load curve and find

1) Max demand

2) Units generated/day

3) Average load

4) Load factor.

ii) Explain the types of load forecasting. **(6)**

(OR)

b) Explain the important objectives of power system and various control strategies during its operation. **(16)**

12. a) With the block diagram of speed governing system, explain the Automatic Load Frequency Control. Also derive necessary equations. **(16)**

(OR)

b) A sub-grid has total rated capacity 2500 MW. It encounters a load increase of 50 MW if the normal operating load is 1000 MW. Assume inertia constant (H) to be 5 sec and regulation of the generators in the system as 2 Hz/p.u MW. Find (i) ALFC loop parameters (ii) static frequency drop, (iii) Transient response of the ALFC loop. Assume load frequency dependency to be linear.

13. a) i) Name the generators and consumers of reactive power in a power system. **(8)**

ii) What are static var systems ? State the advantages of SVS. **(8)**

(OR)

b) Explain the following methods of voltage control :

i) Tap changing transformers **(4)**

ii) Shunt reactors **(3)**

iii) Synchronous phase modifiers **(3)**

iv) Shunt capacitors **(3)**

v) Series capacitors. **(3)**

X 60510

14. a) Draw the flow chart for obtaining the optimum dispatch strategy of N-bus system neglecting the system transmission loss. **(16)**

(OR)

b) Obtain an optimum economic schedule of a three generators for a total load of 900 MW. **(16)**

The details of fuel cost functions are given below.

$F_1 = 392.7 + 5.544\ P_1 + 0.001093\ P_1^2$,

$F_2 = 217 + 5.495\ P_2 + 0.001358\ P_2^2$,

$F_3 = 65.5 + 6.695\ P_3 + 0.004049\ P_3^2$,

P_1, P_2, P_3 in MW :

Generation limits

$150 < P_1 < 600$ MW, $100 < P_2 < 400$ MW, $50 < P_3 < 200$ MW.

15. a) i) What is EMS ? What are its major functions in power system operation and control ? **(6)**

ii) Draw a block diagram to show the hardware configuration of a SCADA system for a power system and explain the application of SCADA in monitoring and control of power system. **(10)**

(OR)

b) Explain the security monitoring using state estimation with necessary diagrams. **(16)**

_____